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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,931	06/04/2001	Robert D. Horning	H16-16009 US	4429

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EXAMINER	
RAO, SHRINIVAS H	
ART UNIT	**PAPER NUMBER**
2814	

DATE MAILED: 07/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/873,931	HORNING ET AL.	
	Examiner	Art Unit	
	Steven H. Rao	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 May 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *19-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *09/22/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment

Applicants' amendment filed on May 17, 2005 has ben entered and forwarded to the examiner on May 19, 2005.

Therefore Claims 19 and 28 have been amended to place the language to produce a strain compensated p+ layer ' at the place in the claim where the germanium concentration is listed to more clearly set forth that this is the difference over the prior art.

The above change is merely cosmetic change and does not change the scope of the claims.

Claims 20-27 and 29-36 as previously recited are currently pending in the Application.

Claims 1-18 were previously cancelled.

Claim Rejections - 35 USC Section 1 03

The following is a quotation of 35 U.SJC. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negatived by the manner in which the invention was made.

Claims 19-21 and 28-30 are rejected under 35 U.S.C. 103 as being obvious over

Wu et al. (U.S. Patent No. 6,521,041, herein after Wu) as previously applied and further in view of Radamson et al. (Electrical characterization and strain compensation effect and thermal stability of B-doped Si-Ge/si hetero structures by H. H. Radamson, 0. Nur et al. , Linkoping University , Sweden)

With respect to claim 19, Wu describes a device produced according to the method of claim 1. (Wu lightly doped silicon substrate having first and second side and less than 5 x 10 19 cm -3 boron therein - Wu fig. ID col. 4 line 29., placing a p+ layer on the first side of the substrate having a boron content of greater than 7x 10 19 cm -3 and a Germanium col. germanium content of Ix 10 cm (Wu - col. lines 20-25., 21 -3 boron - abstract line14).

Wu does not specifically describe the presently newly added limitation to produce a strain compensated p+ layer .

However Radamson article describes in page 1397 left hand column 1St full paragraph) that that Ge concentration results in strain compensated layer , to produce devices having both low hall and drift mobilities.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Radamson's description of low germanium content (preferably range of 0 <x<0.23) in Wu's device. The motivation to make the above combination is to produce devices having both low hall and drift mobilities. (Radamson abstract last two lines).

The remaining limitations of claim 19 are: Forming a mask on the second side to etch a predetermined pattern- Wu.col. 8 lines 5-10, 30-40*, etched second side of the p + layer

- Wu col. 8 lines 6-7,35-40, lines an insulator on said p+ layer and fabricating an electronic component on said insulator (insulator fig. 10 in the embodiment when layer 1008 is bulk insulating material, col.13 lines 50-54 - col. 14 lines 7-10 and electronic components - col. 7 lines 50-60).

With respect to claim 20, Wu describes the device of claim 19, wherein said boron content is greater than Ix 1020 cm3 (Wu col. 4 line slland the germanium f bout 0.5 X 10 21 cm-3 to about 2.0 X 10 21 CM-3. (Wu col. 10 line 20-content is from a 25) .

With respect to claim 21 Wu describes the device of claim 19, wherein said micromechanical. structure is a pressure sensor. (Wu col. 7 lines 54,58-59).

With respect to claim 28, Wu describes a device produced according to the method of claim 10. Claim 28 repeats the elements of claim 19 and recites an buried p+ layer below the lightly doped layer (WU figure 1D).

With respect to claim 29, Wu describes the device of claim 28, wherein said boron content is greater than Ix 1020 cm3 about 0.5 X 10 21 cm-3 to about 2.0 X 10 21 CM-3. (Wu col. 10 line 20-content is rom a 25).

(Wu col. 4 line slland the germanium

With respect to claim 30, Wu describes the device of claim 28, wherein said micromechanical structure is a pressure sensor. (Wu col. 7 lines 54,58-59).

B. Claims 22, 27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (U.S. Patent No. 6,521,041, herein after Wu) in view of Radamson et al. (Electrical characterization and strain compensation effect and

thermal stability of B-doped Si-Ge/si hetero structures by H. H. Radamson, 0. Nur et al. , Linkoping University , Sweden) as applied to claims 19-21 above and further in view of Stemme et al. (U.S. Patent No. 6,546,804, herein after Stemme).

With respect to claims 22 and 31 Wu describes the device of claim 21.

Wu does not specifically describe the electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams.

However Stemme in col. 4 lines 1 1-12 and col. 7 lines 14 describes electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams to form ultraminiaturized sensors having high sensitivty in a cost effective manner .

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to specify Stemme's dielectrically isolated piezoresistors and resonant microbeams for the unspecified sensors of Wu in Wu's device to form ultraminiaturized sensors having high sensitivty in a cost effective manner . (Stemme col. 2 lines 38-48).

With respect to claim 27 The device of claim 19, wherein said micromechanical. structure includes a dielectrically isolated piezoresistor formed on a top surface of a first wafer, a second wafer is bonded to said first wafer, and said second wafer forms a single crystal piezoresistor. (Stemme fig. 16 and col. 2 lines 20-36 Wu figure 10).

C. Claims 23 to 26 , 32 to 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (U.S. Patent No. 6,521 ,041, herein after Wu) in view of Radamson et al. (Electrical characterization and strain compensation effect and

thermal stability of B-doped Si-Ge/si hetero structures by H. H. Radamson, 0. Nur et al. , Linkoping University , Sweden) and Stemme et al. (U.S. Patent No. 6,546,804, herein after Stemme) as applied to claims above and further in view of Nilsson et al. (U.S. Patent No. 6,252,335, herein after Nilsson).

With respect to claims 23 and 32 Wu describes the device of claim 19.

Wu and Stemme do not specifically describe the micromechanical structure is a cantilevered accelerometer.

However Nilsson in its abstract line 1, etc. describes a cantilevered beam accelerometer to obtain a beam sensor that is small, very sensitive but with minimal rthogonal sensitivity and is highly resistant to shocks.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Nilsson's cantilevered accelerometer as the beam sensor described by Wu and Stemme in their (WU and Stemme's) devices to obtain a beam sensor that is small, very sensitive but with minimal odhogonél sensitivity and is highly resistant to shocks. (Nilsson col. 1 lines 45 to 52).

With respect to claims 24 and 33 Wu, Stemme and Nilsson describe the device of claim 23, wherein said electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams. (Stemme in col. 4 lines 11-12 and col. 7 lines 14).

With respect to claims 25 and 34 Wu, Stemme and Nilsson describe the device of claim 19, wherein said micromechanical structure is a dual wéb biplane accelerometer formed by forming a said p+ layer on both sides of said substrate,

forming a proof mask and flexure etching on both sides of said layer until said etching reaches said p+ layers. (Nilsson figure 1, figure 6, col. 4 lines 33 to 44).

With respect to claims 26 and 35 Wu, Stemme and Nilsson the device of claim 25, wherein said electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams. (Stemme in col. 4 lines 1 1-12 and col. 7 lines 14).

With respect to claims 31and 35 Wu, Stemme and Nilsson describe the device of claim 30, wherein said electronic component is selected from the group consisting of dielectrically isolated piezoresistors and resonant microbeams.

With respect to claims 32 and 36 Wu, Stemme and Nilsson describe the device of claim 28, wherein said micromechanical structure is a cantilevered accelerometer.

Response to Arguments

Applicants' contention that the applied Wu and Radamson references do not teach/suggest p+ layer placed on a first side of substrate said p= having a boron content of greater than 7 x 10 raised to 19 (Wu lightly doped silicon substrate having first and second side and less than 5 x 10 19 cm -3 boron therein - Wu fig. ID col. 4 line 29., placing a p+ layer on the first side of the substrate having a boron content of greater than 7x 10 19 cm -3 and a Germanium col. germanium content of Ix 10 cm (Wu - col. lines 20-25., 21 -3 boron -abstract line14) to produce a strain compensated p+ layer (Radamson article describes in page 1397 left hand column 1st full paragraph) that that Ge concentration results in strain compensated layer) (see below) "The tensile strain induced by B' atoms is partially and totally compensating the

compressive strain induced by Ge in figures (b), (c) and figure I (#) respectively.The strain induced b# 1 8%. Ge ' in it was measured to a value of Delta.. = 0.0122 in figure 1(/). The strain of B-doped samples was measured ' to 0.0103 and 0.0094 in. figure 1(:) and I (c) respectively, showing a compensastion effect which is calculated to (j20 ' 20 -3 j I Tjé . ' Cs ;k; 3 x I . and 4.4 x 10 cm , respectively. calculated B concentration of the SiGe sample in figure 1(:) is consistent with ' SIMS measurements, but the measured B concentration in figure 1(e) is 8 x 1020 cm-3 which is a factor of two larger than the calculated value. This difference in the B concentration between the calculated and SIMS results in figure I(c) is due to defects in the layers." (page 1397 left hand side column)."

Therefore all of the presently recited limitations are taught by the applied references.

Applicants' attempt to distinguish Wu on the basis that it does not have a low Ge etch stop cannot be given patentable weight because none of claims presently recite " low Ge etch stop"

It is believed that Applicants' should be well aware by now that the time tested rule of law Limitation from specification cannot be relied upon .... It is the language of the claims that must particularly point out and distinctly claim subject matter which applicants regard as his invention." In re Lundberg 113 USPQ530 (CCPA 1957).

Applicants' attempt to distinguish Radamson on the basis that one does not know if Radamson's Si-Ge alloy functions as a etch stop will be considered upon recitation of the same in the claims. Assuming arugendo that Applicants' have recited in the claims Si-Ge alloy functions as a etch stop, Radamson and Applicants' use the

same compound under same /simialr circumstances therefore what is true for Applicants' is also true for Rradamson.

Applicants' attempt to distinguish Radamson on the basis that one does not know that Ge is NOT used to create a strain compensasted p + layer is not persuasive because Radamson article describes in page 1397 left hand column 1st full paragraph that that Ge concentration results in strain compensated layer. Applicants' have no valid arguments and are therefore introducing all of these red herings , which may confuse the issue.

Applicants' contention that the Wu reference can be distinguished over the presently recited claims 19 and 28 and dependent claims 20 and 29 (different Ge content range- see rejection above) because the independent claims 19 and 28 recite their silicon doped with about 1 % (i.e. recite ' a germanium content of about 1 x 10 21-3 " cm is not persuasive for the following reasons :

(a) Applicants' arguments are not commensurate in scope with the presently recited claims because the claims recite, "' i tent of about 1 x 10 21 cm - a germanum content 3 " whîch recitation does not exclude any range over the afleged 1 %.(e.g 1-20 % Ge).

If Applicants' want to distinguish on the above mentioned basis then the claims may recite e.g. " no more than about 1 %" or simlar language positively reciting the 1 % limitation and which will exclude the higher percentages of germanium from the scope of the claims.

(b) Assuming arguendo that Applicants' have recited " no more than about I

OA ' 1 Wu contrary to Applicants' contention describes its structure as including plurarity of graded relaxed layers (Col. 8 lines 45-46) wherein the device has SiGe wherein the Ge content is graded from the bottom surface up to the top surface, including up to zero percent at the top surface (as also seen from fig. IA, D and figure 5, Abstract lines 7-8, etc.).

(c) Wu teachings should not be limited to its upper end (18%) of the range of the Ge content in the SiGe layers because Wu teaches SiGe layers with "germanium content less than approximately 18" (col.46 lines 63-65) which range includes all percentages between O (lower end) to 18 (upper end) percent, which percentage range overlaps and includes Applicants' about 1 DA . Fudher Wu in col. 7 lines 18 describes (5 to 10%) and line 19 describes (5 to 15%) and Applicants' claims 20 and 29 describe about 2 OA.

(d) Assuming arguendo that Applicants' have recited " no more than about I %", the Specification as originally 5led contains no disclosure of either the critical nature of the claimed range (about 1 % of Ge) nor any unexpected results arising therefrom. Where patentability is said to be based upon particular range or another value recited in the claim, the Applicant must show the chosen ranges are critical. In re Woodruft 919 F. 2d 1575, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Steven H. Rao whose telephone number is (571) 272 - 1718 The examiner can normally be reached on Monday- Friday from approximately 7:00 a.m. to 5:30 p.m.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. The Group facsimile number is (703) 308-7724.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

06/28/05

LONG PHAM
PRIMARY EXAMINER